

Effectiveness of Bosu Ball Versus Swiss Ball Exercises on Bowling Speed Among Male Sub-Elite Cricket Fast Bowlers in Sangli City- A Comparative Study

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ABSTRACT

Background:

Cricket is a popular sport played in several countries, majorly in India, Australia, England, New Zealand and South Africa. There is different version of cricket i.e. test format, twenty-twenty and one day. It has been stated that fast bowling is the toughest job in cricket and a pace bowler needs to be stronger than the rest of them. In bowling there are 5 stages - the run-up, the pre-delivery stride, the delivery stride, the follow through and the ball release. Core muscle development is believed to be important in many functional and athletic activities as core muscle recruitment enhances core stability and also helps to provides proximal stability to facilitate distal mobility. BOSU was a synonym for 'Both Sides Up'. BOSU ball training works on two principles i.e., balancing of left and right sides and timing efficiency during the up/down movement. Swiss ball exercises quantified abdominal muscle activity during the crunch, push-up and bench-press exercises. Numerous other Swiss ball exercises are used in training and rehabilitation to enhance core stability.

Aim:

To compare the effect of BOSU ball and Swiss ball exercises on bowling speed among male sub-elite cricket fast bowlers in Sangli city.

Methodology:

Participants were explained about the nature of the study and the intervention. Their informed written consent was taken. 32 participants were selected based on the selection criteria. Prior and after the treatment both the outcome measures, core stability and bowling speed test were measured. The bowlers were asked to bowl as fast, accurate and consistently as possible as you would bowl in a match. The speed of this balls was measured in km/hour using the radar gun. The core stability was checked by Pressure Biofeedback Unit, the participants were told to lie flat on back with PBU under there back and knees flexed. Then the PBU was inflated to 40 mmhg and the participants were told to

extend their leg while controlling their core muscles and the change in the PBU were noted. Subjects were randomly divided into 2 groups. Group A was given BOSU Ball exercises and Group B was given Swiss Ball exercises. All the exercise were performed for 6 weeks, 3 alternate days per week.

Results: Statistical analysis was done within group using paired t-test, which showed significant improvement post exercise protocol in both the groups p value 0.001. Statistical Analysis done between group using unpaired t-test showed significant improvements in Group A compared to Group B post exercise protocol with p value 0.001. The effect size of group A was 8.05 for core stability and 6.05 for bowling speed test and the effect size of group B was 4.91 for core stability and 4.43 for bowling speed test. Which shows Group A is better than Group B.

Conclusion: Both the exercise groups are effective in improving core stability and bowling speed but BOSU Ball group was found to be more effective than Swiss Ball group.

Keywords: BOSU Ball, Swiss Ball, Core Stability, Bowling Speed, Radar gun, Pressure Biofeedback Unit, Cricket, Fast Bowlers.

INTRODUCTION

Cricket is a popular sport played in several countries, majorly in India, Australia, England, New Zealand and South Africa. There is different version of cricket i.e. test format, twenty-twenty and one day.¹ It has been stated that fast bowling is the toughest job in cricket and a pace bowler needs to be stronger than the rest of them. In bowling there are 5 stages. The run-up, the pre-delivery stride, the delivery stride, the follow through and the ball release. It is during the pre-delivery and delivery-stride the lumbar spine and muscles are beneficial to the biomechanics of the bowler. Fitness and strength are the key factor. Along with this trunk strength is also vital for a paceman. The role of trunk flexion is the facilitation of bowling arm rotation, fluidity of action and contribution to the rhythm, has

a significant contribution to the bowling speed²

Trunk rotation aids in the arm reaching to a fully cocked position while the external and internal oblique muscles serve as a trunk rotators, rectus abdominus as Antero lateral flexors, paraspinals as rotator and lateral flexors, the bowling side gluteus maximus as a push off force while the non-bowling side gluteus acts as a pelvic stabilizers during hip flexors. All of this is significant because the activation pattern of this muscles creates counter clock wise rotation of trunk and contralateral flexion which contributes to the forces producing abduction of bowling arm.²

The thoraco lumbar fascia and its interdigitation with transverse abdominus muscle also has an important role to play as it facilitates and maintains trunk rotation

and semi-rigid cylinder necessary for bowling performance and via its attachment to the *lattismus dorsi* which has an indirect link to the humerus. The *transverse abdominus* has been found to be the first trunk muscle active with voluntary lower and upper limb movement in each direction and with loading of trunk producing trunk flexion. Thus, the coordinated activations and appropriately timed of muscles influencing spine motions reduces the need for the shoulder muscles to act as a primary mover of the arm. The spine acts as an important component of the kinematic chain transferring force from the lower limb to the upper limbs, as well as functioning as a force generator for accelerating the arm²

Core, has been used to refer to the lumbo pelvic-hip complex. It involves deeper muscles such as *transverse abdominus*, *internal oblique*, *transverseospinalis*, *quadratus lumborum*, and *psoas major* and *minor* and superficial muscles such as the *rectus abdominus*, *Erector spine*, *external oblique*, *lattismus dorsi*, *gluteus maximus* and *medius*, *hamstrings* and *rectus femoris*. Core muscle development is believed to be important in many functional and athletic activities as core muscle recruitment enhances core stability and also helps to provides proximal stability to facilitate distal mobility.³For best core stability each the deeper, smaller and the superficial, larger core muscles should

contract in sequence with applicable tension and timing.³

The use of Swiss ball training for developing core muscle has been popular for several years. Studies have examined that core muscle recruitment during various type of Swiss ball exercises. Many studies also suggest that the use of Swiss ball exercises quantified abdominal muscle activity during the crunch, push-up and bench-press exercises. Numerous other Swiss ball exercises are used in training and rehabilitation to enhance core stability and development.³ Swiss ball training are also likely to result in better coordination of stabilizer and synergistic muscle as well as it enhances neuromuscular pathways leading to greater strength, proprioception and balance.⁴

BOSU was a synonym for 'Both Sides Up'. It meant that it can be used on either side i.e., the dome or the platform. BOSU ball training works on two principles i.e., balancing of left and right sides and timing efficiency during the up/down movement. Improving these two fundamental capabilities helps in enhancing performance of all movements.⁵ BOSU ball exercise in the field of physical fitness affects the development of power, motor speed, agility, balance, flexibility, endurance, accuracy, and coordination. This in term leads to a significant effect on the

physical performance and promoting physical and functional efficiency.⁴

Core stability is defined as the body's ability to control the position of the trunk and pelvis for optimum production; transfer and control of functional activities.³ Many sporting activities such as bowling requires complex coordination between the upper and lower limbs. The core functions as the central link between the upper and lower extremities, and stability of this region is proposed to be a requisite for optimal athletic performance and injury prevention.⁹

The aim of the study is to compare the effect of BOSU ball and Swiss ball exercises on bowling speed among male sub elite cricket fast bowlers in Sangli city. The objective of this study was to – 1) find out the effect of BOSU ball exercise on bowling speed by improving core stability in sub elite cricket players. 2) To find out the effect of Swiss ball exercise on bowling speed by improving core stability in sub elite cricket players. 3) To compare the effect of BOSU ball and Swiss ball exercises on bowling speed by improving core stability in sub elite cricket players.

MATERIALS & METHODS

METHODOLOGY

1. Type of Study – Comparative Study
2. Study Design – Randomized Clinical Trial
3. Study duration – 6 months

4. Type of sampling – Convenient sampling
5. Sample size – 32 total sample size, 16 in each group
6. Study setting – Cricket clubs in Sangli

MATERIALS

1. BOSU ball (weighted rubber half stability ball on molded plastic platform.)
2. Swiss ball
3. Radar gun
4. Pressure Biofeedback Unit
5. Mat

PROCEDURE

The Institutional Ethical Committee provided ethical approval. Subjects were chosen based on the criteria for inclusion. The protocol was described to the subjects in vernacular language before to the study. Prior to the intervention, the subjects signed a written informed consent form. After that subject were divided into 2 groups Group A BOSU Ball group and Group B Swiss ball group. The subjects were tested for bowling speed and core stability. Pre and post bowling speed and core stability was measured by Radar Gun and Pressure Biofeedback Unit respectively. The bowlers were asked to bowl as fast, accurate and consistently as possible as you would bowl in a match. The speed of this balls was measured in km/hour using the radar gun.

The core stability was checked by Pressure Biofeedback Unit, the participants were told to lie flat on back with PBU under there back and knees flexed. Then the PBU was inflated to 40 mmhg and the participants were told to extend their leg while controlling their core muscles and the change in the PBU were noted. The intervention will be given for 3 alternative days, for 6 weeks.

GROUP A [Exercises on BOSU ball]:

- 1. BOSU ball plank** – Place the grey side of the BOSU ball towards you. Bend down and keep your elbows on the rubber side of the ball. Extend your legs and rest your toes on the floor. Your body should be in one line from your shoulders to your heels. Squeeze your entire core, gluteus, and quads, and tuck your butt under a little to keep your lower back straight. Make sure you are not dropping your hips or hiking your butt up high toward the sky. Position the neck in neutral position and your focus is in between your hands. Hold this position for 30 seconds.
- 2. Crunch** –Start seated on a BOSU ball with your hips near the floor. Interlace your hands behind your head and let your head fall weightless into your hands. Lie back arching your back over the BOSU ball. Press your feet into the floor and crunch both your hips and torso up off the BOSU ball. Make sure you aren't pulling on your head, keep it weightless in your hands.

- 3. BOSU ball cross sit ups** – Lie face up on the ball. Bend your knees so that your feet are fully in contact with the ground. Interlace your hands behind your head. Twist your body and bend your knee up (for e.g., your left knee) so that your right elbow crosses your and touches your left knee. Then switch and twist to the other side.
- 4. BOSU ball one leg bridging** –Lie on your back and place your hand on the floor, as you bend one leg and keep on the ball and lift your other leg towards sky. Pressing your heel on the ball lift your pelvis up keeping your body in stiff bridge position.
- 5. Sit up**– Lie flat on the ball with your fingers interlace before you, knees bend and feet flat on floor. Engage your core use your abs muscles to lift your back of the ball.

GROUP B [Exercises on Swiss ball]:

- 1. Swiss ball curl up** – Sit on the ball with your feet in contact on the floor and your arms crossed over your head. Tilt back into a 45-degree angle, bending at your hips and raising up on your toes without moving your feet. Use your abdominal muscles to pull yourself backup into a sitting position without lifting you.
- 2. Swiss ball push up** - Bend your elbows and lower your chest down to the ball maintaining your position. Pause for a movement then straighten your arms to return to the starting point. Keep the ball and your posture as straight as possible.

3. **Swiss ball knee drive** – Place your hand on the Swiss ball and maintain balance while keeping your torso stationary raise your knees up towards your chest in alternating manner.
4. **Swiss ball McGill side raise with hip abduction** – Place the ball between both the legs in side lying position. Lift your pelvis up and down and squeeze your glutes and core muscles as hard as you can.
5. **Swiss ball lower abdominal cable curl** – Lie on a mat and flex your legs around the ball while holding it. As you exhale tighten your lower belly and lift the ball with your

legs, while lifting your hips slightly of the mat. Return your hips and lower back to mat with control, while still holding the ball between your legs.

All the exercise will be performed for 6 weeks, 3 alternate days per week for 30 mins each day.

- 3 sets of 15 repetitions in the 1st week.
- 4 sets of 15 repetitions in the 2nd week.
- 4 sets of 20 repetitions in the 3rd and 4th week.
- 4 sets of 25 repetitions in the 5th and 6th week.



Figure No. 1 – BOSU Ball Plank



Figure No. 2 – BOSU Ball Crunch



Figure No. 3 – BOSU Ball Cross Sit Ups



Figure No. 4 – BOSU Ball one leg Bridging



Figure No. 5 – BOSU Ball Sit Ups



Figure No. 6 – Swiss Ball Crunch



Figure No. 7- Swiss Ball Push Ups



Figure No. 8 – Swiss Ball Knee Drive



Figure No. 9 - Swiss ball McGill side raise with hip abduction



Figure No. 10 - Swiss ball lower abdominal cable curl

Statistical Analysis

GROUP A

Pre and Post intervention – will be done by paired t test

GROUP B

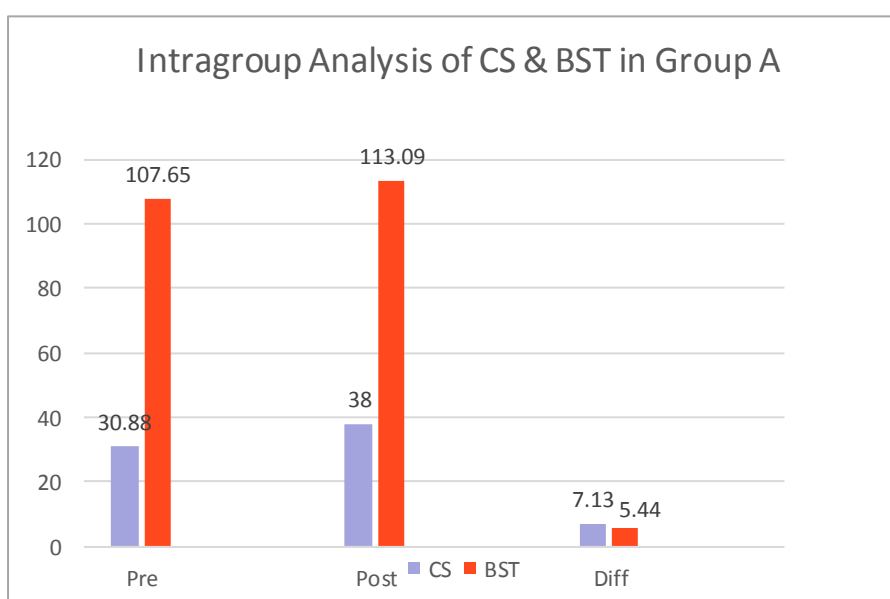
Pre and Post intervention – will be done by paired t test

Between Group A and Group B will be done by unpaired t-test

RESULT

Data analysis was performed using Statistical Package for the Social Sciences [SPSS] software. Statistical analysis was done using Paired and Unpaired t-test.

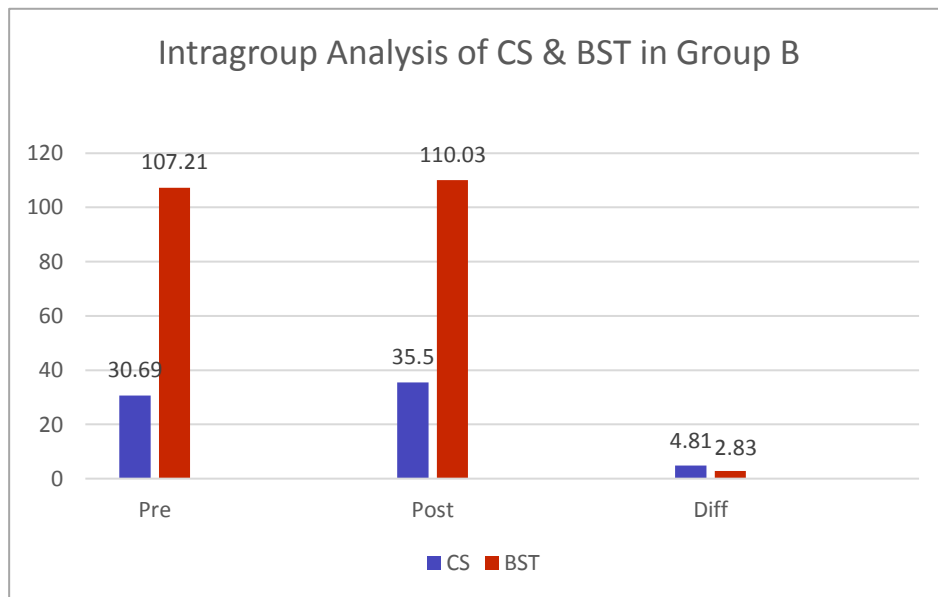
Variable	Pre		Post		Diff		Effect size	t-value	p-value
	Mean	SD	Mean	SD	Mean	SD			
CS	30.88	1.50	38.00	1.21	7.13	0.89	8.05	32.201	0.001*
BST	107.65	5.47	113.09	5.85	5.44	0.90	6.05	24.205	0.001*



- From the above within group A analysis using paired sample t test, it is observed that CS and BST mean value indicated changes post treatment and higher mean values are recorded for post treatment

outcome and also the standard deviation shows the limited consistency with post treatment value which is more than pre value.

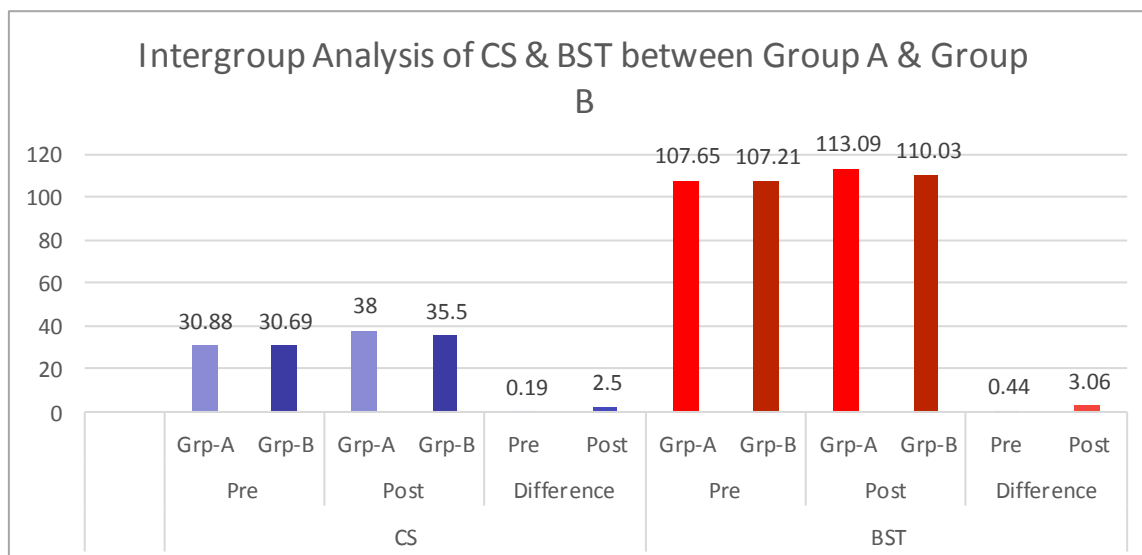
Variable	Pre		Post		Diff		Effect size	t-value	p-value
	Mean	SD	Mean	SD	Mean	SD			
CS	30.69	1.54	35.50	1.10	4.81	0.98	4.91	19.621	0.001*
BST	107.21	4.59	110.03	4.68	2.83	0.64	4.43	17.705	0.001*



- From the above within group B analysis using paired sample t test, it is observed that CS and BST mean value indicated changes post treatment and higher mean values are recorded for post treatment

outcome and also the standard deviation shows the limited consistency with post treatment value which is more than pre value.

Variable	Time frame	GROUP	Mean	SD	t-value	p-value
CS	Pre	Grp-A	30.88	1.50	0.349	0.729
		Grp-B	30.69	1.54		
	Post	Grp-A	38.00	1.21	6.124	0.001*
		Grp-B	35.50	1.10		
	Difference	Grp-A	7.13	0.89	7.001	0.001*
		Grp-B	4.81	0.98		
BST	Pre	Grp-A	107.65	5.47	0.249	0.805
		Grp-B	107.21	4.59		
	Post	Grp-A	113.09	5.85	1.635	0.112
		Grp-B	110.03	4.68		
	Difference	Grp-A	5.44	0.90	9.497	0.001*
		Grp-B	2.83	0.64		



- From the above table no.3 it is observed that between groups analysis is not significant for CS and BST across the pre time frame at 5% level significance but it is significant for post and difference values at 5% level significance since p-value is less than 5% level (i.e. $0.001 < 0.05$).
- Thus, it is inferred that there is a substantial statistically significant difference between the groups across post and difference values.

Variable	Group A Effect size	Group B Effect size	Remarks
CS	8.05	4.91	Group A is better
BST	6.05	4.43	Group A is better

- Further from the post and difference mean values; it is observed that group A is better as higher mean is recorded as compared to group B after the medical intervention.

DISCUSSION

The purpose of this study was to compare the effect of BOSU ball and Swiss ball exercises on bowling speed among male sub elite cricket fast bowlers with an objective of finding the benefits of each exercise and comparing its effects to fulfil the aim of the study.

Cricket is popular sport played in several countries, majorly in India. It has been stated that fast bowling is the toughest job in Cricket and a pace bowler needs to be stronger than the rest of them.

The role of trunk flexion is the facilitation of bowling arm rotation, fluidity of the action and contribution of the rhythm, has a significant contribution to the bowling speed. The spine acts as an important component of the kinematic chain transferring force from the lower limb to upper limbs, as well as functioning as a force generator for accelerating the arm.

Core muscle development is believed to be important in many functional and athletic activities as it enhances the core stability and also helps to provide proximal stability to facilitate distal mobility.

Outcome measures used for this study were Radar gun and Pressure Biofeedback unit, for bowling speed and core stability respectively.

According to Pedro O. P. Lima, Rodrigo R. Oliveira et al (2012) Concurrent validity of the pressure biofeedback unit and surface electromyography in measuring transversus abdominis muscle activity in patients with chronic nonspecific low back pain the specificity of pressure biofeedback unit is 60% and low sensitivity was 60%. The positive predictive value of pressure biofeedback unit was high which was 0.8 and negative predictive value was low which was 0.2.¹⁰

The study was taken place in Crickingdom Cricket Academy by Rohit Sharma, Sangli. There were 32 participants selected according to criteria and were randomly divided into 2 groups (Group A and Group B) with each containing 16 participants. Group A was asked to perform BOSU Ball exercises according to given procedure and Group B was asked to perform Swiss Ball exercises. Pre and Post assessment was taken using outcome measures like Bowling Speed Test and Core Stability after 6 weeks. The study was done for 6 weeks and 3

alternate days per week. Statistical analysis was done of pre and post assessment.

As core muscles contracts, they help stabilize the core by stiffening and compressing the spine. It is important because the osteoligamentous lumbar spine buckles under compressive loads and core muscles act as a guy wire to stabilize the spine and prevent spinal buckling. Trunk flexion during bowling has been found to be related in providing significant contribution to the speed of the ball. Research has shown that the core muscles serves as center of functional kinetic chain and motor control strength and endurance associated to achieving the stability target and enhance athletic performance in cricketers. In this study, it was seen that cricketers with well-developed core strength were able to bowl significantly faster than cricketers with low average core strength this may be because core strength and stability provide greater control of lumbar spine in neutral zone allowing lesser lateral movement so that the forces are transferred through the body in straight line allowing bowlers to achieve the required target and therefore increase the bowling speed.

Previous study by Bruce Kevin Hilligan (2008) the purpose of this study was to determine whether a relationship exists between core stability and bowling speed in Action Cricket bowlers. Thirty asymptomatic indoor Action Cricket fast

and fast-medium bowlers were divided into two groups of 15 each; with Group A having well developed core stability and group B having poorly-developed core stability. This study suggests that well developed core stability has a positive effect on Bowling Speed.²

Another study “The effect of BOSU Ball versus Swiss Ball on core strength in overweight and obese post-menopausal working women” by Ankita Mane, Amrutkuvar Rayjade (2020) was conducted in Krishna Institute. Subjects were randomly divided into 2 groups Swiss Ball and BOSU Ball group. 24 subjects were included in this study 12 in each group. Many physiological changes occur in women throughout the postmenopausal period.. Among them core muscle weakness, pelvic floor dysfunction is common. There can be some measures taken for improving core strength in women. So, this study is an effort made to check either BOSU ball is effective or Swiss ball. In this study it was found that BOSU Ball group is effective than Swiss Ball group.⁷

Unstable surfaces, such as BOSU ball, Swiss ball have been used to improve neuromuscular stress in core muscles as compared to the stable surfaces. Performing exercises on such unstable surfaces has been found to increase proprioceptive demands and stress the muscles to a larger extent than performing exercises on stable surfaces.

BOSU Ball can be used on either side i.e., the dome or the platform. BOSU ball training works on two principles i.e., balancing of left and right sides and timing efficiency during the up/down movement. Improving these two fundamental capabilities helps in enhancing performance of all movements.⁵ BOSU ball exercise in the field of physical fitness affects the development of power, motor speed, agility, balance, flexibility, endurance, accuracy, and coordination. This in term leads to a significant effect on the physical performance and promoting physical and functional efficiency.⁴

Surface such as BOSU ball provide rubber resistive training with a stable surface which leads to improved resistance of whole working muscles and therefore back muscles and abdominal muscles strength is increased.

This study rejects the null hypothesis and supports the alternative hypothesis that is there was a significant difference in the effect of BOSU ball vs Swiss ball exercises on bowling speed among male sub elite cricket fast bowlers in Sangli city.

So, according to this study both the exercise groups are effective in improving core stability and bowling speed but BOSU Ball group was found to be more effective than Swiss Ball group.

CONCLUSION

The result of this study shows that the BOSU Ball exercise group is more effective than Swiss ball exercise group to increase bowling speed in cricket fast bowlers.

The improvements in Group A and Group B are both significant but Group A was found to be more effective based on the effect size of the intervention in cricket fast bowlers.

Hence, the BOSU Ball exercises can be widely used and can be accepted for increasing bowling speed in cricket fast bowlers.

Hence the study concludes BOSU Ball exercise group has significant effect on bowling speed in cricket fast bowlers.

The limitations of this study were– 1) Only fast bowlers were included (speed above 97 kmph)

2)The following study can be conducted at different levels of cricket players.

3) Only male participants were included.

The suggestions for further studies are – 1) Study can be done in different sports.

2)Study can be done to compare male and female.

3)Study can be done on larger population.

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Conflict of Interest: None

Source of Funding: None

Ethical Approval: Approved

REFERENCES

1. Sarika S, Balajirao WS, Shenoy S. Evaluation of acute effects of combined stretching methods on flexibility, agility and speed among cricket players. *European Journal of Physical Education and Sport Science*. 2019 Jun 18.
2. Hilligan BK. The relationship between core stability and bowling speed in asymptomatic male indoor action cricket bowlers (Doctoral dissertation).
3. Escamilla RF, Lewis C, Bell D, Bramblet G, Daffron J, Lambert S, Pecson A, Imamura R, Paulos L, Andrews JR. Core muscle activation during Swiss ball and traditional abdominal exercises. *Journal of orthopaedic& sports physical therapy*. 2010 May; 40(5):265-76.
4. Stanton R, Reaburn PR, Humphries B. The effect of short-term Swiss ball training on core stability and running economy. *The Journal of Strength & Conditioning Research*. 2004 Aug 1; 18(3):522-8.
5. Wing CH. The BOSU Ball: Overview and Opportunities. *ACSM's Health & Fitness Journal*. 2014 Jul 1; 18(4):5-7.
6. Feros SA, Young WB, O'Brien BJ. Relationship between selected physical qualities, bowling kinematics, and pace bowling skill in club-standard cricketers. *The Journal of Strength & Conditioning Research*. 2019 Oct 1;33(10):2812-25.
7. Mane A, Rayjade A. Effect of BOSU Ball Versus Swiss Ball on Core Strength in Overweight and Obese Post-Menopausal

- Working Women. Medico Legal Update. 2020 Nov 18; 20(4):69-74.
8. Sawant RA, Chotai K, Patil S, Rayjade A. Effectiveness of BOSU Ball Exercises Versus Thera Band Exercises on Core Stabilization and Balance Performance. Indian Journal of Forensic Medicine & Toxicology. 2020 Apr 1; 14(2).
9. Anand PC, Khanna GL, Chorsiya V, Geomon T. Relationship of core stability with bowling speed in male cricket medium and medium fast bowlers. Al Ameen J Med Sci. 2017; 10(3):8-11.
10. Lima PO, Oliveira RR, Moura Filho AG, Raposo MC, Costa LO, Laurentino GE. Concurrent validity of the pressure biofeedback unit and surface electromyography in measuring transversus abdominis muscle activity in patients with chronic nonspecific low back pain. Brazilian Journal of Physical Therapy. 2012;16:389-95.

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